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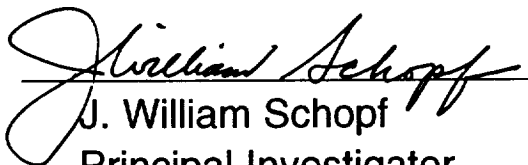
By: 
J. William Schopf
Principal Investigator

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MAJOR RESEARCH ACCOMPLISHMENTS SUPPORTED BY NAGW-2147, 1 JANUARY 1990 - 30 SEPTEMBER 1997

RESEARCH RESULTS COMMUNICATED IN EDITED BOOKS

As listed in the final section of this report, research supported by NAGW-2147, 1 January 1990 - 30 September 1997, resulted in publication of five edited books. Foremost among these is the award-winning volume *The Proterozoic Biosphere, A Multidisciplinary Study* (Cambridge Univ. Press).

- A monumental (1,348 pp.) research monograph, *The Proterozoic Biosphere, A Multidisciplinary Study* was completed, edited, and published (1992; Cambridge University Press). This volume provides a detailed analysis of the interrelated geologic, environmental, and biologic history of the Earth from 2,500 to 550 million years (Ma) ago on the basis of studies of 1,781 geologic samples carried out at UCLA by a team of 41 scientists from eight countries (Australia, Canada, Denmark, Germany, Russia, South Africa, Sweden, USA). (*Reference #1.*)
- Like its predecessor published in 1983 -- a monograph by the same research team spanning the time from the origin of the Earth, 4,500 to 2,500 Ma ago, (*Earth's Earliest Biosphere, Its Origin and Evolution*; 543 pp.; Princeton University Press) -- *The Proterozoic Biosphere* was selected by the Association of American Publishers as winner of the Professional and Scholarly Publishing Award as the Outstanding Volume in Earth Science. Both award-winning monographs report research supported by NASA funding. (*References #1, #2.*)

RESEARCH RESULTS COMMUNICATED IN JOURNAL ARTICLES AND BOOK CHAPTERS

As listed in the following section of this report, research supported by NAGW-2147, 1 January 1990 - 30 September 1997, led to publication of 39 journal articles and book chapters. Principal research results thus communicated:

- Report discovery and formally describe the oldest fossils now known, 11 species of $3,465 \pm 5$ Ma-old microorganisms from the Apex chert of northwestern Western Australia (*References #3, #4.*)
- Provide the first quantitative detailed analysis of the evolutionary development of the global ecosystem from 2,500 to 550 Ma ago (*References #5, #6.*)
- Summarize the historical development of the emergent field of Precambrian paleobiology (*Reference #7.*)

- Present the first detailed morphometric analysis of all known Proterozoic microorganisms providing a basis for interpretation of their affinities, geologic distribution, and evolutionary trends (*Reference #8*).
- Provide an up to date in-depth analysis of the time and nature of major events in Proterozoic biotic evolution (*Reference #9*).
- Present the single exhaustive authoritative analysis of the morphologies, biological affinities, and taxonomy of all Proterozoic microfossils now known (*References #10, #11, #12*).
- Present major generalizations regarding the markedly differing tempos and modes of Precambrian and Phanerozoic evolutionary histories (*Reference #13*).
- Elucidate the biochemical and evolutionary relations among, and the rapid Archean development of, the principal metabolic processes of the global ecosystem (*Reference #14*).
- Report discovery of diverse ~2,600 Ma-old stromatolitic microorganisms from South Africa that provide an important evolutionary link between the recently described Early Archean Apex microorganisms and the more or less continuous fossil record of the later Proterozoic (*Reference #15*).
- Provide new data regarding the cyanobacterial affinity of the oldest fossils now known, 3,465 Ma-old microbes from northwestern Western Australia (*Reference #16*).
- Present results of exhaustive morphometric analyses comparing ~1,500 species of living cyanobacterial and bacterial prokaryotes with a worldwide sample (~4,000 taxonomic occurrences) of Precambrian microfossils in order to elucidate patterns of microbial evolution 3,500 to 550 Ma ago (*Reference #17*).
- Report and describe seven newly discovered richly fossiliferous microbiotas, from Neoproterozoic (~600 to ~1,000 Ma-old) stromatolitic units of east-central Brazil including the most diverse, best preserved such microbial assemblage now known from all of South America (*Reference #18*).
- Use the known fossil record of cyanobacteria and the carbon and sulfur isotopic compositions of ancient sediments to evaluate the 1996 "protein clock"-based claim of Doolittle et al. that cyanobacteria date from ~1,500 Ma ago, the last common ancestor of currently living systems from ~2,000 Ma ago (*References #19, #20*).
- Evaluate critically recent reports of microfossil-like objects and other purported evidence of past life in Martian meteorite ALH84001 (*References #21, #22, #23*).

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PUBLISHED CONTRIBUTIONS SUPPORTED BY NAGW-2147, 1 JANUARY 1990 - 30 SEPTEMBER 1997

As listed below, results of research supported wholly or in part by NAGW-2147 have been communicated in a total of 84 contributions (5 edited books; 39 journal articles and book chapters; 15 book-related items; 3 miscellaneous publications; 15 abstracts; and one edited book and six other contributions currently In Press).

EDITED BOOKS

1. SCHOPF, J. W. (Ed.). 1992. Major Events in the History of Life (Jones and Bartlett: Boston), 190 pp.
2. SCHOPF, J. W. and KLEIN, C. (Eds.). 1992. The Proterozoic Biosphere, A Multidisciplinary Study (Cambridge University Press: NY), 1348 pp.
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5. SCHEIBEL, A. B. and SCHOPF, J. W. (Eds.). 1997. The Origin and Evolution of Intelligence (Jones and Bartlett: Boston), 169 pp.

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BOOK-RELATED ITEMS (Prefaces, Glossaries, Indices)

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15. SCHOPF, J. W. 1997. Index. In: A. B. Scheibel and J. W. Schopf (Eds), The Origin and Evolution of Intelligence (Jones and Bartlett: Boston, MA), 165-169.

MISCELLANEOUS PUBLICATIONS

1. SCHOPF, J. W. 1995. The oldest fossil evidence of life. Paleontological Society Brochures (The Paleontological Society), 7 pp.
2. SCHOPF, J. W. 1996. Confessions of a Mars skeptic. *Los Angeles Times*, August 18, 1996, p. M5.
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ABSTRACTS

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1. SCHOPF, J. W. (Ed.). In Press.. Evolution! Facts and Fallacies (Academic Press: San Diego, CA), in press.

JOURNAL ARTICLES AND BOOK CHAPTERS

1. SCHOPF, J. W. In Press. Tracing the roots of the Universal Tree of Life. In: A. Brack (Ed.), The Molecular Origins of Life: Assembling Pieces of the Puzzle (Cambridge Univ. Press: New York).
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BOOK-RELATED ITEMS (Prefaces, Glossaries, Indices)

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